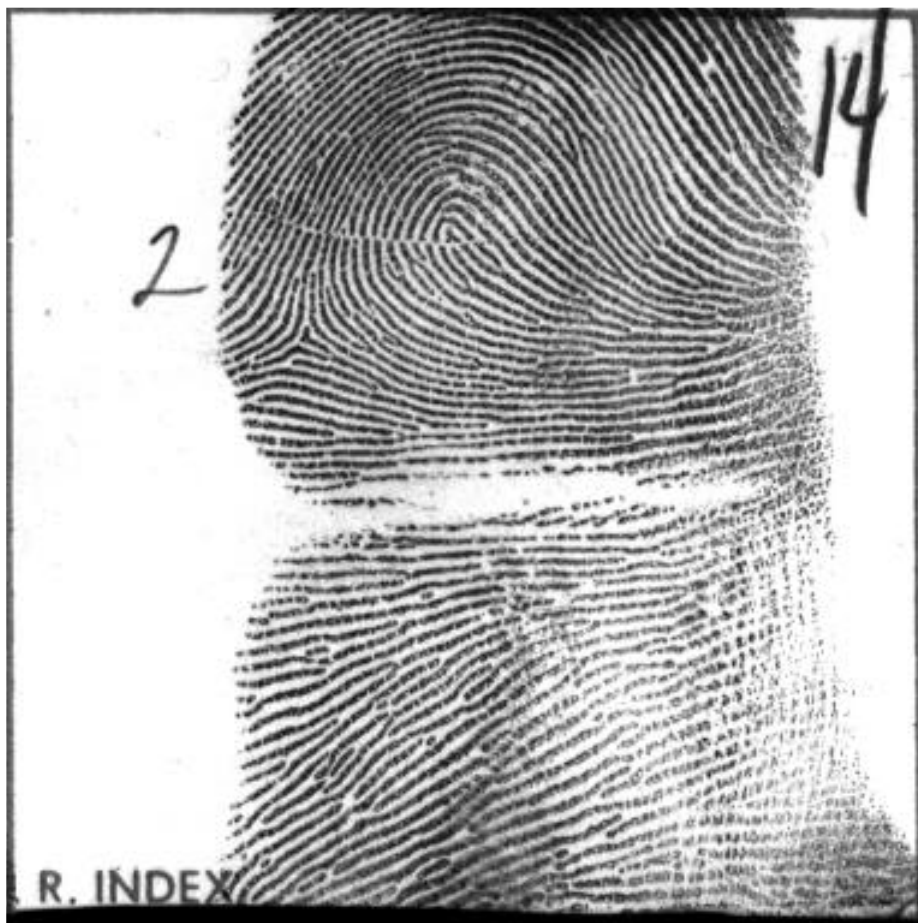


BITS computing & communications news

March 1998

COMPUTING, INFORMATION, AND COMMUNICATIONS (CIC) DIVISION • LOS ALAMOS NATIONAL LABORATORY

Los Alamos is helping the Federal Bureau of Investigation (FBI) deal with its massive collection of fingerprint cards which contains more than 200 million cards and is growing at a rate of 30,000-50,000 new cards per day. The FBI is digitizing these cards to allow for electronic storage, retrieval, and transmission. Because of data storage requirements and the time needed to send a fingerprint card over a modem, these files must be compressed. However, the JPEG image compression standard developed by ISO does not preserve the details the FBI requires. Chris Brislawn and Jonathan Bradley of CIC-3 are developing a new compression technique to produce sharper reconstructed images. This new technique is based on discrete wavelet transforms instead of the cosine transform used in the JPEG standard. See the article on page 6 for details.



Inside this issue

Feature Articles

CIC-1 Communicates in Words, Pictures, and Pixels	1
System Layers and the Year 2000	3
Enabling Cookies and Java Script on Netscape	5
Transition of Machine Gamma to UNICOS 9.0.2.6	5
The Image Compression Standard for Fingerprints	6

WWW at LANL

Extending Web Documents: Getting Ready for XML	8
---------------------------------------------------	---

In the Classroom

Research Library Training	11
Labwide Systems Training	12
Advanced Technical Computer Training	14

Index	21
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Customer Service Center(505) 665-4444 or cichelp@lanl.gov

Because of the wide variety of CIC computing services, numerous facilities are available to address your questions. If you are uncertain whom to call, you can always call the Customer Service Center (CSC). CSC consultants are trained to either answer your question or locate someone who can. To reach the appropriate consultant, dial 665-4444 and make your selection from the following choices:

Option 1: New user topics including e-mail, passwords, registration, and World Wide Web.

Option 2: Labwide Systems such as Travel, Time and Effort, and Purchase Cards.

Option 3: Scientific computing, storage systems, and networking.

Option 4: Classroom instruction and training.

Option 5: Desktop Consulting for PC and Macintosh software and network configurations.

Consulting Via E-Mail

Customer Service Center.....cichelp@lanl.gov

Scientific and engineering computing.....consult@lanl.gov

Administrative and business computing.....labwide@lanl.gov

Passwords and registration.....validate@lanl.gov

Macintosh computing.....Mac-help@lanl.gov

PC computing.....PC-help@lanl.gov

UNIX computing.....UNIX-help@lanl.gov

Other Useful Numbers

Advanced Computing Laboratory.....665-4530

Central Computing Facility.....667-4584

Network Operations Center.....noc@lanl.gov or 667-7423

Telephone Services Center.....667-3400

CIC-1 Communicates in Words, Pictures, and Pixels

This is one in a series of interviews BITS is conducting with CIC group leaders and project leaders to get their views of the “big picture” as it relates to their work and the Laboratory mission. These people have also been asked to do a little forecasting as it applies to their business. BITS invites readers to join in the spirit of these interviews, treating the forecasts as a sort of informed speculation without holding anyone’s “feet to the fire” to make the predictions come true.

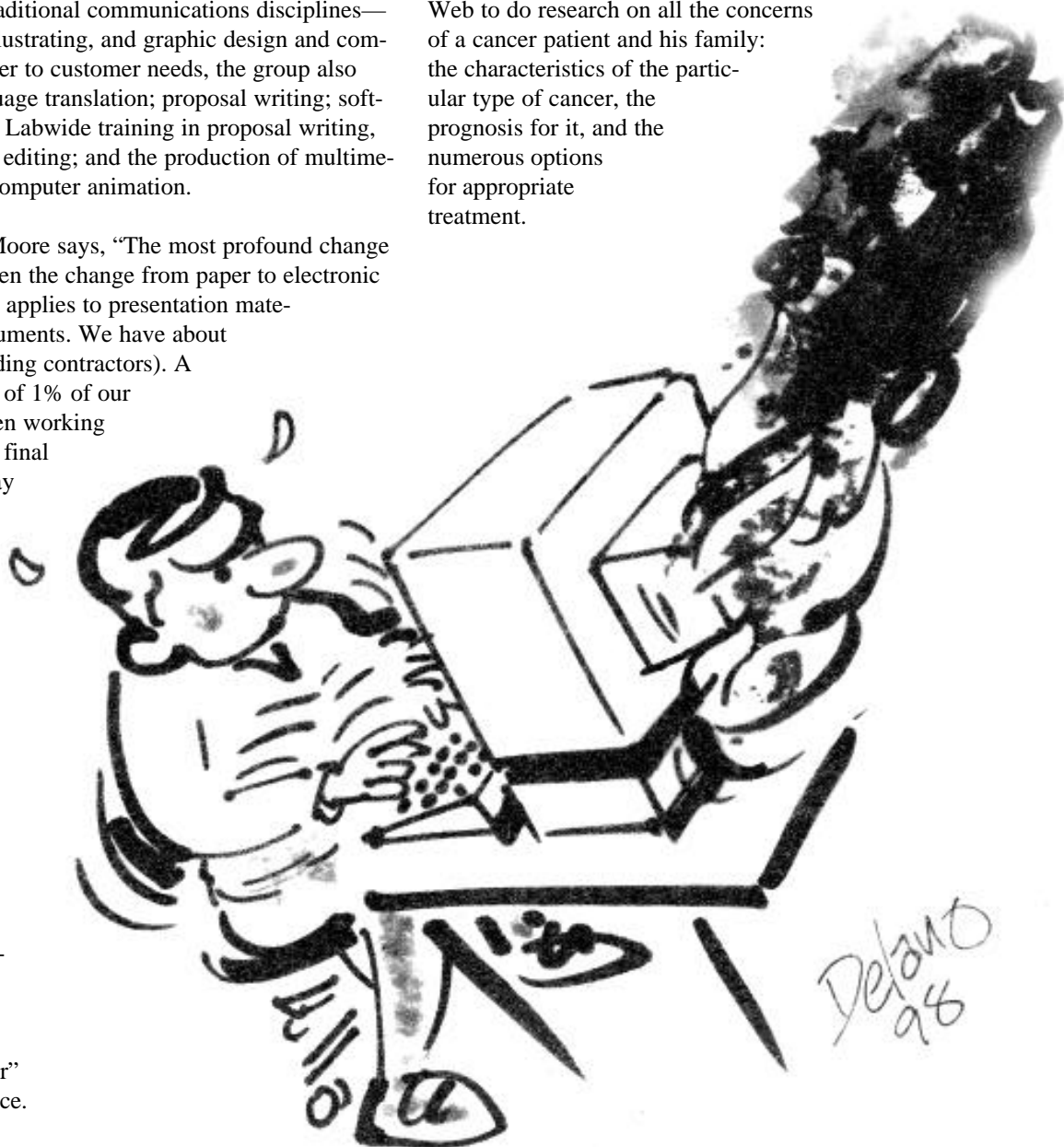
The Communications Arts and Services (CIC-1) group helps its clients shape the messages that communicate the Laboratory’s work. The group has always done this with its professionals in the traditional communications disciplines—writing and editing, illustrating, and graphic design and composition—but in answer to customer needs, the group also provides foreign language translation; proposal writing; software interface design; Labwide training in proposal writing, scientific writing, and editing; and the production of multimedia, Web pages, and computer animation.

Group Leader Mary Moore says, “The most profound change in our business has been the change from paper to electronic communications. This applies to presentation materials as well as to documents. We have about 150 employees (including contractors). A year ago an aggregate of 1% of our people might have been working on jobs intended for a final electronic output, today it’s about 10% of our group, and we predict that in two years it will be at least 30%.”

Presently about 60% of the CIC-1 group members are assigned long-term to individual client organizations, and they are being asked more and more frequently to assist with electronic communications, especially Web pages. The other 40% work on jobs that come in through the “front door” of CIC-1’s central office.

Nine of those employees work almost exclusively on electronic products. Most of the rest have some involvement with electronic documents or electronic presentation materials. In fact, CIC-1’s “front door” is now electronic. Clients can fill out and submit a work request form on the Web (<http://www.cic-9.lanl.gov/cicwebform.html>).

Moore says the World Wide Web is driving communications toward shorter user times and fewer words that convey more information. An anecdote from her own life serves as an example. When her husband was diagnosed with cancer, she turned to the Web to do research on all the concerns of a cancer patient and his family: the characteristics of the particular type of cancer, the prognosis for it, and the numerous options for appropriate treatment.



Realizing that a couple of years ago such research would have taken time and travel to a library to find and copy articles and to stores to purchase books, she was amazed that in one day she had all the information she could use. "The downside," she says, "is that you get 10 different viewpoints on the appropriate treatment of this cancer, and you have no way to really know which of them are valid." (The result of the Web research was an informed decision to have surgery, and the patient is doing very well.)

Moore says that although there will always be some paper pages, the gradual trend will be toward fewer traditional publications and far fewer people willing to read 200-page reports. Moore poses the question: "How do communicators (including everyone in the division who produces communication products) plan their careers? Skills need to grow along the lines of Web communications. The principles are the same, but the requirements for the medium may be different. In addition, thought processes are different. For example, you can't develop an argument very well in a Web-page environment. Thinking and organizing must change as well as your skills and training."

Moore predicts that CIC-1 group members and other communicators will have to retain and extend their traditional skills but become less specialized, add cross-training, and increase teaming. For example, electronic products still need experts in grammar and design, but the information itself needs to be mapped and chunked to make it more accessible. Professionals in each discipline will need to learn more about the electronic communications media and how people use them.

To meet its customers' needs in the future successfully, CIC-1 will follow a strategy of providing plenty of training options for its employees, encouraging them to grow outside of their traditional roles, and rewarding them for doing so. Besides training and cross-training, the continuing challenge is to understand the audience for communications products. For example, just because something is on the Web, it may still be more effective to focus the communication on a target audience of users rather than on "the world." Although finding and targeting that audience is difficult right now, developing Web technologies (e.g., "cookies") may make it easier to do so.

Bottom line for the group? Moore sees future electronic communications almost as 30-second "infomercials" used by busy people to get more information in less time. She says that the division's service providers need to make that kind of infor-

mation access available to their customers and stakeholders. She adds, "To do so we must be agile and cost-effective, and we must shorten our turnaround times as the customers take advantage of the speed of electronic communications."

Taking its own advice, CIC-1 has "information-mapped and chunked" its message onto its own Web pages (<http://www.lanl.gov/cic1/>) to show customers the full suite of the group's services. These pages include the electronic work request and submittal forms for the three main Laboratory publication series: LA reports, LAURs (Los Alamos Unlimited Releases), and LALPs (Los Alamos Controlled Publications). In the first quarter of 1998 CIC-1 will place Chapter 3, "Policies and Formats," of the Laboratory publications manual on-line. The group will update and publish the remainder of this document as time allows to clarify and transmit the Laboratory's publications policies.

CIC-1 implemented its electronic forms and Labwide classes as a result of customer feedback. In further response to customer surveys, CIC-1 has lowered rates by 8% over two years, strengthened its quality control program, improved its employee training, and produced an informational brochure about its services. Accumulated feedback data show that CIC-1 customers value high quality, on-time delivery, and accuracy, in that order. They expect the staff to deliver on commitments and to exhibit both professional and technical skills. Moore is confident the group will continue to meet these expectations. She says of her employees, "It would be hard to find a more professional group of people than this one."

Moore has been at the Lab for 14 years. She began her career as a teacher, but when she and her husband moved to Los Alamos in 1983, she changed careers completely and began work at the Lab as a word processor. In time she became a technical editor, then a section leader, then a group leader. This movement has allowed her to view the world as a worker and manager and as a customer and service provider. In her free time she skis, reads, and joins her husband on journeys to such far-off places as Botswana, New Zealand, Egypt, Thailand, and Peru.

System Layers and the Year 2000

Will your system work in the Year 2000? This question may seem easy until you consider the layers within your system that may be affected. You will not be home free until you have ensured that all of the five layers described below will handle the date changeover correctly. To follow up on the information given here, use the resources found at the IA Year 2000 Web site located at <http://www.lanl.gov/projects/ia/year2000/>. When appropriate, Web paths that lead to specific topics are also provided.

Layer 1: Hardware

The bottom layer is the chip itself. Here are some status reports:

- All Mac chips are Year 2000 compatible.
- The Intel 286 chip will not boot when the Year 2000 comes. The chip gets so confused that it will not start the computer.

- Most Intel 386 and 486 chips used in PCs before 1995 will also have problems.
- Even some Intel PENTIUM chips have problems because of the way the chip is integrated into the PC motherboard.

The Intel Web site (<http://support.intel.com/support/year2000/>) includes a reference list by motherboard serial number that indicates which PCs have chip problems and what upgrades may be required.

Web path for more information: IA Year 2000/Readiness/Chips.



Layer 2: Operating Systems

The next layer is the operating system (OS). The OS is the main control program that runs the computer. It runs continuously, sets the standard for running applications, and resides in memory at all times. The following information is a starting point:

- All versions of Mac OS are Year 2000 compliant.
- NT 4.0 and higher are also compliant.
- Windows 95, Windows 3.1, and DOS are not compliant.
- Silicon Graphics workstations require IRIX 6.5, which is due out this summer.

If you are running an older operating system on a PC, it is time to consider moving to NT 4.0, NT 5.0 (now in beta and due out this summer), or Windows 98, now in beta 3 for public home use, with the final version due out in the second quarter of 1998. Many of the UNIX systems are compliant, but it is your responsibility to be sure you are running the right version and patch levels. For more details, see the following Web site: <http://www.lanl.gov/projects/ia/year2000/compliance.html#st-os>.

Web path for more information: IA Year 2000/Readiness/Standard Operating Systems.

Level 3: Commercial Applications

The middle layer is commercial off-the-shelf software purchased from software companies. These applications may require you to purchase the latest release to be Year 2000 compatible. They include the following:

- CAD software.
- E-mail packages.
- Word processing systems.
- Database systems.
- Code development software (e.g., compilers).
- Code management systems (e.g., PVCS).

For current Year 2000 status of these products, go directly to each company's Year 2000 product status report, which is now commonplace on company Web sites. Links to those pages covering Laboratory standard software and many non-standard software products are provided on the IA Year 2000

Web page. If your software is not listed, please let us know and we'll add it so that others can also benefit.

Web path for more information: IA Year 2000/Readiness/Standard Software and Selected Sites/Software.

Layer 4: Custom Applications

Software developed at the Laboratory comprises the fourth layer. This layer is more complex and costly to fix because a software developer must find the source code and look for dates in the code. The programmer must also look at what computations and sorting are performed on those dates. Often the code must be modified to function correctly, but you must first answer the following questions:

- Will the application accept "00" as a valid year?
- What calculations are performed based on the date?

Web path for more information: IA Year 2000/Testing.

Layer 5: Data Exchange

The final layer is data exchange. Ask yourself the following questions about the files your application receives or sends:

- Do the files have dates in them?
- Will the date be expanded to a 4-digit year? If so, when?
- If the date is not expanded, what agreement exists between the sender and receiver of the file?

Don't be surprised if you suddenly start receiving files with two extra characters in the date field to indicate the century. Even though this practice should not be unexpected, it would be better if the sender of the file communicated with the receiver beforehand about the specific practice being used. For example, some systems use windowing to represent a date. Using this practice, any year designation less than "50" is preceded with "20" (e.g., 2049); dates greater than or equal to "50" are preceded with "19" (e.g., 1950). This is a valid agreement and a good solution in many cases. But again, it is important that this agreement be made explicit and not assumed.

Of the many ways to approach the Year 2000 compatibility issues, looking at your system layers and addressing the specific issues for each, seems to be one of the clearest.

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Year 2000 Council Leader, IA Project Leader*

Enabling Cookies and Java Script on Netscape

When running a Lab-wide application on the Web, you may get the following message.

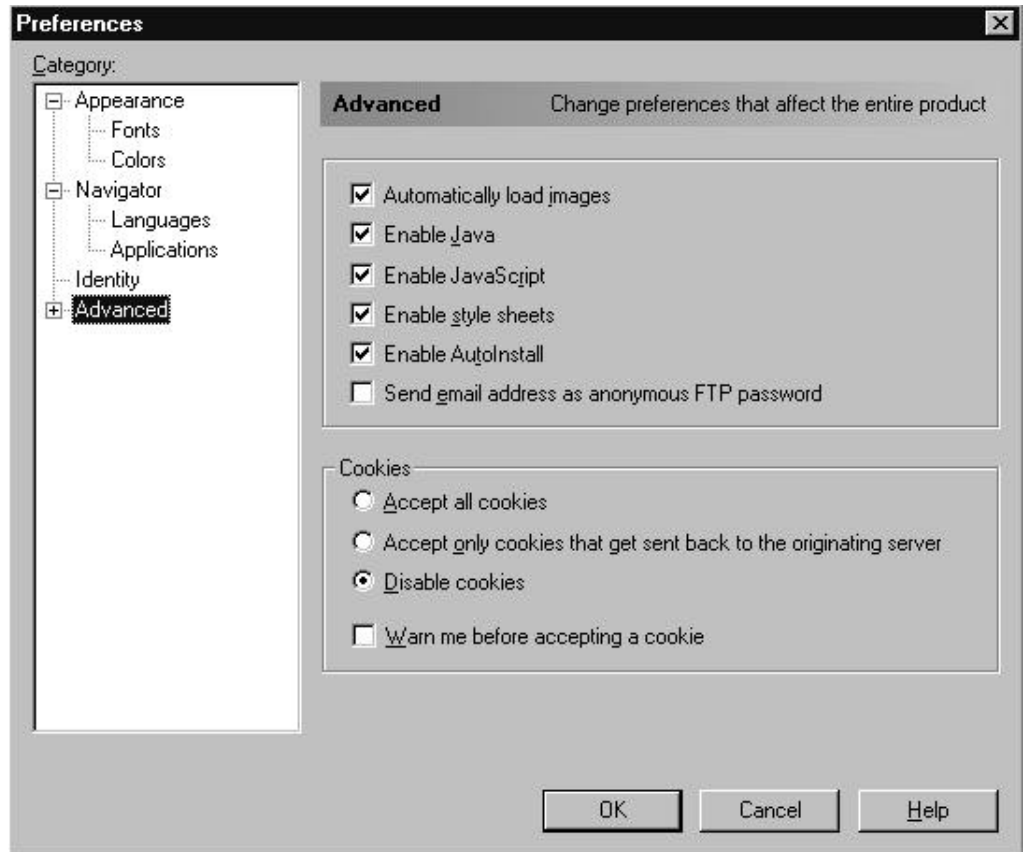
This system requires that “cookies” security be enabled in your browser. If you have any questions about how to set up your browser to do this, contact CIC-6 Desktop Consulting at 7-HELP.

On Netscape, version 4.0, which is the Lab IA standard, complete the following steps to enable cookies.

1. Pull down the Edit menu and select Preferences...
2. Click on Advanced to bring up the screen shown at right.
3. Click on the Accept all cookies button.
4. Be sure Enable JavaScript is checked.
5. Click OK.

In order for the buttons and links to work correctly, you must have the JavaScript language enabled on your browser.

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Transition of Machine Gamma to UNICOS 9.0.2.6

Machine gamma will begin transitioning to UNICOS 9.0.2.6 in March. The target date for the upgrade is March 23, 1998.

Dedicated system time running UNICOS 9.0.2.6 will be available for developers in March. A detailed schedule with

the DST dates and times will be available through the news utility on gamma.

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Computing Group (CIC-7)

The Image Compression Standard for Fingerprints

The Federal Bureau of Investigation (FBI) has been collecting fingerprint cards since 1924. Over the past 70 years the Bureau's collection has grown to more than 200 million cards occupying an acre of filing cabinets. A single fingerprint image measuring 750 X 800 pixels equals 600,000 bytes of data (or about 300 pages of text). The FBI is digitizing its fingerprint database at 500 dots per inch with 8 bits of gray-scale resolution. At this rate, one fingerprint card (containing 10 prints) turns into about 10 megabytes of data. The total digitized collection represents 2,000 terabytes. And fingerprint data continues to accumulate at a rate of 30,000–50,000 new cards per day.

The data storage requirements and the time required to send a fingerprint card over a modem make data compression a necessity. Many people might assume that a lossless compression method would be required to preserve every pixel. But in practice, lossless compression cannot achieve the FBI's target rate of about 0.75 bits per pixel. Therefore, lossy compression must be used, which means the FBI must tolerate some distortion in the compressed images.

The new image compression standard developed by the Joint Photographic Experts Group (JPEG) does not preserve the details the FBI requires; moreover, it produces artifacts that affect the performance of automated systems that attempt to trace out ridges to help classify fingerprints (See Figure 1). By using a different method, known as wavelet/scalar quantization, we have been able to achieve the FBI's target bit rate while preserving necessary details (see Figure 2). Our method is based on discrete wavelet transforms instead of the cosine transform used in the JPEG standard.



Figure 1. The fine details in the fingerprint are gone after a 12.9-to-1 JPEG compression. The resulting artifacts (the artificial blocky pattern superimposed on the image) affect the performance of automated systems that attempt to trace ridges to help classify the fingerprint.

The JPEG standard uses a variation of the traditional Fourier transform. It converts a signal into a continuous series of waves, each of constant frequency and amplitude and of infinite duration. In contrast, most real-world signals (such as sounds and images) have a finite duration and changes in frequency. Wavelet transforms convert a signal into a series of wavelets to better approximate real-world signals. We found that Fourier transforms are inefficient for compressing fingerprint images; wavelet transforms result in sharper reconstructed images.

However, choosing wavelets for image-coding applications is still a somewhat inexact science, requiring trial and error.



Figure 2. The same image after compression with our method shows that the fine details are preserved better than they are with JPEG compression, and no blocking artifacts occur. When image quality is of primary concern, wavelet transform coding is superior.

There are a few standard wavelet families that seem to work reasonably well for image coding, although that is not what they were specifically designed for. In the future, we hope to be able to design wavelets that are optimized for a specific application, such as fingerprints. Until then, we and the FBI will stick with proven performers.

The goal of this project was to design and implement a national standard for coding and compressing digitized fingerprint images. LANL, the FBI, and the National Institute for Standards and Technology (NIST) have developed and are currently implementing this national specification. In 1996, we helped NIST set up compliance tests for commercial vendors who wish to have their encoders (which compress fingerprint files) and decoders (which reconstruct the images) tested against the standard's specifications and certified by the FBI.

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(CIC-3)*

Extending Web Documents: Getting Ready for XML

“Finally we are breaking the Web page paradigm because with XML I don’t need to have pages any more. I can think of documents as being much richer than just pages.”

—Jonathan Seybold

“The hypertext markup language ... was an experiment that got out of the lab too soon.”

—Jeffrey Veen

For those of us who have spent the past few years arguing which HTML tags to use and which to avoid, the good news and the bad news are one and the same: Within a year or so, those arguments will be meaningless. Instead of arguing about whether to <BLINK> and <CENTER>, we’ll be worrying about whether our markup is “well formed” and “valid.”

As has become increasingly clear, the HyperText Markup Language (HTML) has always had certain limitations. It is good for basic documents and it has served us well, but its interpretation is too dependent on which features browser vendors choose to hardcode into their products. Each new feature requires a new tag or attribute, adding more bulk to an already complex specification and more size to already large browser software.

The Extensible Markup Language (XML) represents a fundamental shift in the way we approach markup. Instead of being a set of tags and attributes itself (which HTML is), XML is a set of rules for defining tags and attributes. Instead of forcing mathematicians and artists and whoever else to all use the same markup language, XML provides a way for the various user communities to define their own specialized markup languages.

Furthermore, while HTML is primarily designed for sending pages to browsers, XML extends to other types of content and other types of user agents. For example, metadata (information about information) can be tagged for interpretation by customized search engines, or columns and rows of data can be tagged for input into Java-based spreadsheets.

In this article, I’ll address the current status of XML, provide a general overview of how it works, and suggest some ways that we can write HTML pages today so that they’ll be closer to ready for XML as it becomes more widely supported.

Current Status

On February 10, 1998, the World Wide Web Consortium (W3C) approved the XML 1.0 specification as a W3C

Recommendation. As a W3C Recommendation, it is considered an international standard, which many vendors have pledged to support.

Both Microsoft and Netscape were involved in authoring the specification, and both have been working on XML implementations. Microsoft has XML parsers in Java and C++ that are already incorporated into Internet Explorer 4.0. In addition, Microsoft’s Channel Definition Format (CDF) and Extensible Stylesheet Language (XSL) are both based on XML. For its part, Netscape has introduced Meta Content Framework (MCF), an XML-based specification for machine-readable descriptions of distributed information.

Beyond the major Web vendors, there are already a number of freeware XML tools that have emerged for noncommercial use. JUMBO, as one example, is a set of Java classes developed by Peter Murray-Rust which processes, among many other things, molecular diagrams and mass spectrums. It uses the Chemical Markup Language (CML), which is an XML application.

An additional XML language, the Mathematical Markup Language (MathML), was recently released as a W3C Proposed Recommendation, which means it is considered an essentially stable specification. MathML describes the rendering and structure of mathematical notation, and it is already fully supported by Java applications that can run with any up-to-date Web browser.

Given this growing support, it seems likely that XML will soon emerge as a viable, usable specification. “Soon,” of course, is difficult to define. For specific applications with narrow, targeted user bases, XML is already usable. For broader applications such as public Web pages, it will take longer for the tools to become widely available.

Also, it appears unlikely that XML will supersede HTML in the foreseeable future. Instead, XML will probably be a supplement, adding capabilities for the Web but not replacing what’s already in place. HTML is already used and supported, and there’s no reason to expect that browsers that already support HTML will stop supporting it (though we may see new browsers begin to appear that are XML specific).

Within this context, we needn’t feel pressure to convert all our existing HTML documents to XML. HTML retains all the validity it ever had. If, however, we are working on documents that we expect XML might become useful for, then we might want to code the HTML in such a way that it will be

easier to convert. Fortunately, the two languages are close enough that this isn't difficult to do.

What is XML and How Does It Work?

XML is a version of the Standard Generalized Markup Language (SGML), simplified and optimized for the Web. SGML is the language that HTML is written in; XML is the language that future Web markup languages can be written in.

XML documents will look quite familiar to HTML authors, since XML calls for document elements to be marked up with tags and attributes in much the same way that HTML does. For example, HTML's `<P ALIGN=CENTER>` might become `<PARA ALIGN="CENTER">` in an XML language, slightly different but easily recognizable.

What these elements are and how they can be used are defined in a Document Type Declaration (DTD) for "valid" XML documents. (The term "valid" will be further explained below.) This, too, is similar to HTML, whose tags and attributes are defined in an SGML DTD.

How the elements should be rendered is defined in a stylesheet, which might specify, for example, that a particular section of text should be rendered in boldface type for visual displays. Such stylesheets can, but are not required to, be written according to the W3C Recommendation for Cascading Style Sheets (CSS) level one.

The relationship between a document and its DTD and stylesheet is illustrated below.

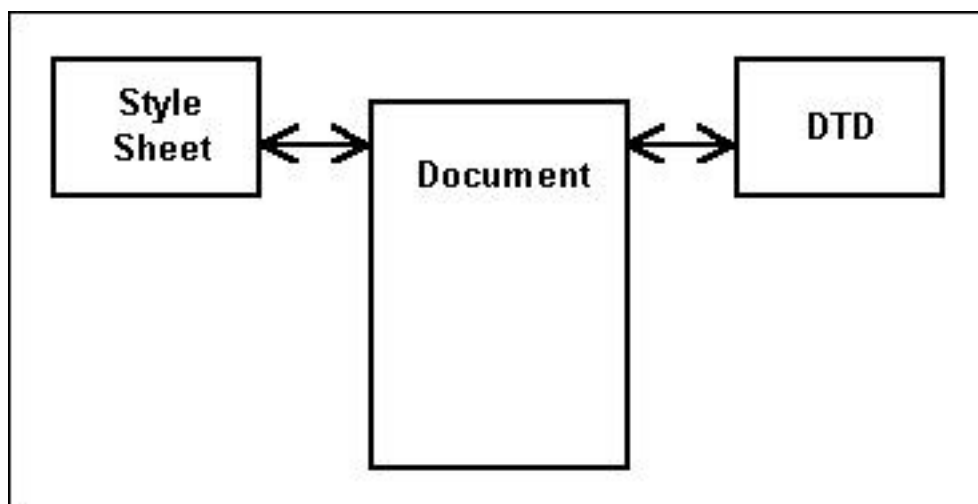
When a user agent (such as a browser or indexing robot) encounters the document, it looks to the DTD to determine what the document's elements are and then to the stylesheet to determine how to render them. This means that computers can read and interpret XML documents without any preprogrammed knowledge of the markup. Browser software no longer needs to have the interpreting hardcoded into it, which should lead toward leaner programs and improved performance. The markup language itself can be tailored to the specific needs of a user community, with extraneous "features" eliminated and performance again improved.

Note that the DTD is not always required under XML, and even when a DTD is used, additional markup can be introduced within the document provided that it follows XML's rules. The following terms are used in XML:

- A document is "well formed" if all of its markup follows the rules of XML, regardless of whether it has a DTD.
- A document is "valid" if it has a DTD and is well formed.

Even with a well-formed, DTD-less document, however, a stylesheet is still the mechanism for controlling the display of the document's elements.

In addition to the components outlined above, a Document Object Model (DOM) is under development by the W3C. DOM will specify an interface to allow dynamic updates to the content, structure, and style of a document. This is the heart of the "Dynamic HTML" that both Netscape and Microsoft refer to with their version 4.0 browsers, though consensus on its final form has not yet been reached.



Under XML, anyone who knows how to write stylesheets and DTDs can write a new markup language. This does not mean, however, that all Web authors will need to learn how to write stylesheets and DTDs. What's far more likely is that specialists will write languages targeted to specific user communities, and that Web authors will then use those languages the same way we currently use HTML. Mathematicians will have one language, chemists another, musicians another, and so on.

Writing HTML for Portability to XML

First, the bad news is that HTML is not an XML-compliant markup language. The W3C HTML 4.0 specification permits certain usage outside XML's rules and prohibits other usage required by XML. The good news is that the differences are small and a well-written HTML document can be easily converted to XML.

As an example of the differences, consider the tag, which is called an "empty element" because it does not markup anything outside itself. In HTML, the tag is used as follows:

```
<IMG SRC="imagename.jpg">
```

There is no end tag, and the HTML 4.0 specification prohibits the use of a end tag.

Under XML, however, all markup needs to be closed, either with an end tag or with ">" for empty elements. Either of the following would be well-formed XML elements:

```
<IMG SRC="imagename.jpg"/>
```

```
<IMG SRC="imagename.jpg"></IMG>
```

Unfortunately, neither of these is permissible under HTML 4.0. Hence, every valid HTML document that contains s would need them changed in order to convert them to well-formed XML.

Given that complete compliance is out of reach, there are still a number of things that can be done to make HTML markup closer to compliance so that it will be easier to convert when the time comes.

1. Use Case Consistently. Unlike HTML, tags and attributes in XML are case sensitive. <P> is different from <p>. <P> can only be closed by </P>.

2. Close Tags Whenever Possible. There are a number of tags in HTML that have optional end tags, such as <P>, <TR>, <TD>, and . These can be closed even though HTML doesn't require it (e.g., use <P>, </TR>, </TD>, and at the elements' end). Note that the HTML 4.0 specification does not permit end tags for the following empty elements: <AREA>, <BASE>, <BASEFONT>,
, <COL>, <FRAME>, <HR>, , <INPUT>, <ISINDEX>, <LINK>, <META>, and <PARAM>.

3. Quote All Attribute Values. The HTML 4.0 specification recommends quoting all attribute values but permits certain values to be unquoted in certain cases. XML requires all attribute values to be quoted. <P ALIGN=CENTER> and <P ALIGN="CENTER"> are both valid in HTML, but only <P ALIGN="CENTER"> is permitted in XML.

4. Ensure Tags Are Properly Nested. If there is markup within markup, make sure the internal markup is closed first so that no markup overlaps. "<P>Short example</P>" is correct; "<P>Short example</P>" is not (because the opening tags are in the wrong order). Correct nesting is required in both XML and HTML (to the extent that HTML uses end tags), but browser software has not always enforced the requirement.

5. Escape Ampersands. In HTML, an "&" on its own is simply an "&"; in XML, however, it needs to be written "&" (just as < and > need to be written "<" and ">" in both HTML and XML).

Again, complete XML compliance will remain out of reach, but adhering to the above five points will bring HTML documents closer.

For Further Information

This article only touches on part of what XML is and how it can be used. Scripts, for example, will remain browser dependent. By adding SQL and ODBC into the model, dynamic pages can be built from multiple databases. Improved linking includes multi-directional and multi-way links, as well as links to spans of text.

For a list of links to additional XML resources, please see the Information Architecture Web Activity Area page at <http://www.lanl.gov/projects/ia-lanl/area/web/> (Laboratory machines only). For additional information about all of the IA Project's activities, please see our project home page at <http://www.lanl.gov/projects/ia/> (or follow "What's New" on the Laboratory internal home page to see our latest announcements).

If you need printed or e-mail copies of any of the IA materials, please contact me via the information given below.

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Research Library Training

The LANL Research Library provides training for using its specialized databases. Training sessions begin and end at times indicated below. Classes are free but you must preregister by calling the Research Desk at 7-5809 or sending e-mail to library@lanl.gov. Special classes and orientations can also be arranged.

Date	Time	Subject Matter
3/3/98	1:00 - 1:30 p.m.	BIOSIS at LANL
3/4/98	1:00 - 1:30 p.m.	Finding Addresses and Phone Numbers on the WWW
3/4/98	1:00 - 1:30 p.m.	Research Library Tour
3/5/98	2:00 - 4:00 p.m.	InfoSurfing: Basic Web Searching Strategies
3/10/98	1:00 - 1:30 p.m.	Introduction to Electronic Library Resources
3/11/98	1:00 - 1:30 p.m.	Research Library Tour
3/18/98	1:00 - 1:30 p.m.	Finding Addresses and Phone Numbers on the WWW
3/19/98	2:00 - 4:00 p.m.	InfoSurfing: Basic Web Searching Strategies
3/26/98	1:00 - 1:30 p.m.	Earth Sciences Web Resources

Labwide Systems Training

The Customer Service Group (CIC-6) offers training for users of Laboratory information systems. The CIC-6 courses offer training for a variety of personnel including property administrators, group secretaries, training coordinators, budget analysts, group leaders, or anyone needing to access training records, property records, costs, employee information, travel, chemical inventories, etc. Refer to the table below for specific information about courses currently offered.

You must have a valid ICN password before taking any of the courses shown in the table. To register for a course, call the CIC-6 Training, Development, and Coordination section at 667-9559 or access our Web page. From the LANL home page, look under "Services/Computing at LANL/Training" or enter the URL: <http://www.lanl.gov:8010/computer-information/cic6/teampage.html>.

Course Title	Date	Time	Cost	Course Number
Employee Development System - Basic Training (EDS I)	3/5/98	8:30–12:00	\$375	Course #5289
The course provides hands-on instruction to request course enrollment, use the on-line course catalog, retrieve training transcripts, and assign EDS authorities. The student will learn to create courses, add students to the courses, and generate several training reports.				
Employee Development System - Training Plans (EDS II)	3/18/98	8:30–12:00	\$375	Course #7155
Participants receive hands-on instruction to create and maintain training plans, assign assignment codes, and generate training plan reports. Attendees must have prior training in the Employee Development System.				
Eudora Electronic Mail	3/24/98	8:30–12:00	\$375	Course #9762
This class is a hands-on class that teaches the participant how to use Eudora software to create, send, receive, and edit electronic mail messages. In addition to these procedures, the participant will learn what related settings mean and how to configure the system to meet his or her individual needs.				
Data Warehouse Basics	3/12/98	8:30–12:00	\$375	Course #11961
Students will receive hands-on training to generate standard reports and make quick queries from information in the data warehouse, a real-time collection of data tables from Laboratory financial, time-reporting, and personnel systems.				
Data Warehouse/ Financial Reporting	To be announced	8:30–10:30	\$200	Course #11960
Prerequisite: Data Warehouse Basics. Students will receive hands-on training to generate standard financial reports and make on-line queries from information in the "data warehouse," a collection of data from Laboratory budgeting, accounting, and time-keeping systems.				
Foreign Travel (GUI)	3/24/98	1:30–3:30	\$200	Course #12353
This two hour course teaches participants the pre-trip required paperwork using JetForm Filler and the post-trip entry on the Travel GUI System. Prerequisite: Domestic Travel GUI (Course #12113) or permission of instructor.				

Course Title	Date	Time	Cost	Course Number
FrontPage Basics	3/19/98	8:30–12:00	\$395	Course #14815
Participants will learn the basics of laying out a Web site; gain understanding of the Explorer and Editor; create Web pages using templates and themes; add and alter text; customize and enhance the Web page; create links; insert and alter graphics; and layout and create tables. Prerequisites: Utilizing Netscape (Course #10961); HTML Basics (Course #11605) is strongly encouraged.				
HTML Basics	3/3/98	8:30–12:00	\$395	Course #11605
Students will gain a basic understanding of HTML (Hypertext Markup Language), the language for the World Wide Web. Topics covered will be commands and standards, creating and editing documents, and authoring programs.				
Lotus Notes Basics 4.5	3/19/98	1:30–5:00	\$375	Course #9917
Participants receive hands-on computer instruction to learn to create and send Notes e-mail memos, fax documents, search on one or multiple databases, use views and folders, create nicknames and distribution lists, set defaults, create doclinks, send attachments, and replicate databases.				
Meeting Maker	3/3/98	1:30–4:00	\$200	Course #12395
Students learn how to create an address book, create personal groups, utilize the Auto-Pick feature, utilize e-mail integration with non-Meeting Maker users, and customize various Meeting Maker features.				
Purchase Card System (PCS)	3/4/98	1:30–2:30 or 3:00–4:00	\$100	Course #11924
Participants will learn to reconcile monthly statement of account, submit reconciled statement of account for approval, print statement of account for audit records, and delegate reconciliation authority. Participants must attend PCS Overview which is scheduled through Ruby O'Rear, 5-4523.				
Reporting with Infomaker	3/31/98	8:30–5:00	\$550	Course #11054
Hands-on training to query data and develop ad hoc, or non-standard, reports from the LANL data warehouse using Infomaker software.				
Time and Effort System (GUI)	3/26/98	8:30–10:30	\$200	Course #11018
The student will learn how to enter attendance, amend attendance, approve attendance, and submit exception and approval reports. Time codes and associated policies will be discussed. The student will also learn how to use the Information Manager utility to view and print reports.				
Travel (Domestic)	3/17/98	8:30–12:00	\$375	Course #12091
Hands-on training to submit and approve travel requests and expenses in the new Travel System, which replaces the TRIPS on-line system and the post-travel expense worksheets.				

Advanced Technical Computer Training

The Customer Service Group (CIC-6) supports advanced technical training in computing areas such as programming languages, system administration, networking, and World Wide Web development tools. The support provided by CIC-6 can be as limited as providing the appropriate facilities for a specific group or as extensive as coordinating training functions such as system administration, vendor acquisition, EDS administration, and class facilitation. The table below lists classes that are either currently being offered or are available on request. An expanded list of classes that are potentially available can be viewed on the Internet at <http://www.lanl.gov:8010/computer-information/ComputerTraining/Vendor.html>. To request registration in any course or for general assistance, please contact the CIC-Division Advanced Technical Computer Training Coordinator at (505) 667-9399 or send e-mail to cic6-train@lanl.gov. *Cost per student will vary depending on the total number of students enrolled in the class.

Course Title	Date	Cost	Course Number
C++ for Experienced C Programmers	Available on Request (5 days)	\$1800-\$2300*	9050
Prerequisite(s): Excellent C Language programming skills. Topics Include: Major Differences and Additions to ANSI C; Building C++ Classes; Introduction to Text I/O with C++; Function Overloading; Single Inheritance; Virtual Functions; Multiple Inheritance; Operator Overloading; Creating, Initializing and Assigning Objects; Passing and Returning Objects; Templates, Parameterized Functions and Classes; C++Stream I/O with the File System; and C++ Course Summary.			
C-Shell Programming	Available on Request (5 days)	\$1800-\$2300*	4790
Prerequisite(s): Knowledge of basic Unix commands and the ability to use basic programming constructs, such as variables and loops, to write simple programs in at least one programming language. Topics Include: Use Local and Environment Variables; Use Shell Metacharacters and Redirection; Perform Basic String Manipulations and Integer Arithmetic; Use Aliases, History, and Exit Status to Determine if a Command Succeeded or Failed; Employ Flow-Control Constructs (Branching and Loops); Customize the .cshrc and .login Start-up Scripts and the Search Path and Prompt; Create and Debug C-Shell Scripts; Create a C-Shell Script That Interacts With Users, Accesses Command-Line Arguments, Returns an Exit Status, and Makes Decisions Based on Numeric Comparison, String Comparison, or Command Exit Status.			
IDL 5.0 Graphic Object Workshop	4/14-16/98	\$1100-\$1400*	
Prerequisite(s): Completion of Foundations of IDL Programming course or equivalent knowledge and experience. Topics Include: IDL Objects (Object Inheritance and Encapsulation, Object Methods, Creating and Destroying Objects, and Memory Tricks); IDL Object Graphics Workshop - Building an IDL Object Graphics Application (Building an Object Graphics Hierarchy, View-Model Hierarchy and Container Objects, Graphics Atoms [Plot, Surface, Image, Polygon, Polyline], Positioning and Rotating Objects in 3D Space, Light Sources, Color Models - RGB vs. Indexed, System Fonts and 3D Text, Texture Maps, Creating Contours with Object Graphics, IDL Pointers to Pass Data, Using IDL Draw Areas for Object Graphics, Implementing Background Tasks, Bulletin Board Base to Change Object Properties, WYSIWYG Printing, and Helper Objects [Annotations]); and Linking IDL with Other Languages (Call_External, Linkimage, and Callable IDL).			
Java Programming	Available on Request (5 days)	\$1800-\$2300*	11686
Prerequisite(s): Students must have the ability to create compiled programs using an advanced language (such as C or C++) and the knowledge to use basic Solaris commands and a World Wide Web browser (such as Mosaic or Netscape). Topics Include: Using the Java Programming Language to Create Java Applications and Applets; Defining and Describing Garbage Collection, Security, and the Java Virtual Machine; Describing and Using the Object-Oriented Features of the Java Language; Developing Graphical User Interfaces in Java, Taking			

Course Title	Date	Cost	Course Number
Java Programming (continued)	Advantage of the Various Layout Managers Supported by Java; Describing and Using the Java 1.1 Delegation Event Model; Using Java Windowing Components, Including Mouse Input, Text, Window, and Menu Components; Using Java Exceptions to Control Program Execution and Define Custom Exceptions; Using the Advanced Object-Oriented Features of the Java Language, Including Method Overriding and Overloading, Abstract Classes, Interfaces, Final and Static, and Member and Field Access Control; Using Java to Perform File Input/Output; Using Java's Built-In Threading Model to Control the Behavior of Multiple Threads; and Using Java to Access Servers and Clients Through Sockets.		
Object-Oriented Analysis and Design	Available on Request (4 days)	\$1400-\$1800	9049
Prerequisites: Familiarity with fundamental programming concepts (data structures, types, control flow selection, iteration, etc.). Prior experience in systems or software analysis and/or development is useful but not required. Topics Include: Introduction to Objects; Terminology; Foundations and Goals of OOAD; Attributes of Complex Systems; Principles and Features of the Object Model; Object-Oriented Technology and Traditional Approaches; Benefits and Limitations of OOAD; Application Areas and Examples; Purposes of Analysis; Analysis Tasks and Tools; Identifying Relationships, Operations, and Mechanisms; Elements of Design; Design Issues and Problems; Rapid Prototyping; Areas for Research; Object-Oriented Tools (Overview of OOPs, Introduction to Object-Oriented Databases, and Introduction to Other Object-Oriented Tools); Texas Instruments Case Study; and Management Issues (Transitioning to OO Methods, Choosing the First Project, Migration Strategies, and Managing an OO Project).			
Perl Programming	5/5-8/98	\$1400-\$1800	8095
Prerequisites: Knowledge of Unix and basic programming constructs (such as variables and loops) and the ability to write simple programs in at least one programming language. Topics Include: Use PERL's Scalar Variables, Arrays, and Associative Arrays, Including Built-In Functions; Use PERL's Various Operators (Arithmetic, Conditional, String, Etc.); Use Regular Expression Metacharacters and Statement Modifiers; Open Files, Directories, and Input/Output Filters via Filehandlers; Use the UNIX System Interface Functions; Create Subroutines and Use the PERL Standard Library; Use Packages for Encapsulation; Handle Signals and Errors; and Write Nawk-Like Reports.			
SGI Network Administration	4/20-24/98	\$1800-\$2300*	11690
Prerequisite(s): Completion of Silicon Graphics System Administration (Beginning) course or equivalent knowledge and experience. Topics Include: Networking Fundamentals; Network Configuration; Network Troubleshooting; Resource Management with Network; Information Services; Domain Management with Domain Name System; Electronic Mail with Sendmail; Remote File Sharing with Network File System & Automounter; Network Performance Monitoring; and Network Security.			
Solaris 2.X Network Administration	6/8-12/98	\$1800-\$2300*	8107
Prerequisite(s): Completion of Solaris 2.X System Administration (Beginning) class or equivalent knowledge and experience. Topics Include: TCP/IP Networking Model's Major Protocols; Monitor Network Traffic; Monitor and Control the Address Resolution Protocol Cache; Set Up, Configure, and Manage a Sun Internet Router with Subnets; Identify the Differences Between TCP and UDP; Manage Client-Server Transport Layer Communications; Configure and Maintain RPC-Based Applications Support; Describe Common Applications, Systems, and Network Bottlenecks; Test and Monitor System, Disk, and Network Loads; Use Monitoring Commands to Find Performance Bottlenecks; Set Up and Maintain a Simple Domain Naming Service (DNS) Environment; Set Up a Jumpstart Automated Network Installation Server; Identify Sendmail Functionality and Configuration; Install a Mail Server; and Install UUCP Between Existing Solaris 2.X Systems.			

Course Title	Date	Cost	Course Number
UNIX (Basic)	Available on Request (4 mornings)	\$400	5267
Prerequisites: Basic computer literacy (knowledge of the keyboard and mouse) are helpful. Topics: Getting Started; UNIX File System; Editing with VI; Manipulating Files; Using C-Shell Features; Customizing Your Environment; Navigating the Network; Job Control; Generic UNIX E-mail; and Electronic Mail Registration (EMR).			
UNIX (Advanced)	Available on Request (4 mornings)	\$400	12972
Prerequisites: The Basic Unix class or equivalent knowledge. Topics: File Manipulation; File Reorganization; Network File System Concepts; Introduction to C-Shell Scripts; Conditional Execution; Shell Programming; The Korn Shell; Korn Shell Script Features; and SED Filtering Tool.			
UNIX and Windows NT Integration	Available on Request (4 days)	\$1400-\$1800	14608
Prerequisite(s): Familiarity with Unix and NT network administration and TCP/IP protocols is useful. Topics Include: Common NOS Characteristics; Comparing the Operating Systems; Developing an Integration Strategy; Identifying Elements to Integrate; Integrating Protocols; Optimizing Protocols in the Enterprise Environment; Administering IP Addresses; Network File System (NFS); Server Message Block (SMB); Printing Across the Enterprise; Configuring User Accounts; Application Support; Remote System Administration; Resolving IP Addresses; IP Routing; Running Diagnostic Utilities; and Resolving Network Problems.			
Visual C++ Windows Programming	Available on Request (5 days)	\$1800-\$2300	12115
Prerequisites: C Programming experience. Topics Include: Concepts of Object-Oriented Programming; Introduction to Visual C++; Classes in C++; Functions in C++; Constructors and Destructors; Memory Management in C++; References and Argument Passing in C++; Operator Overloading, Initialization, and Assignment; Scope and Access Control; Introduction to Inheritance; Polymorphism and Virtual Functions; Windows Event Handling; Graphics Device Interface; The Mouse; Menus and Resources; Dialog Boxes with MFC; The Keyboard; Document/View Architecture and MDI; and Memory Management and Windows Application Portability.			
Visual Basic 5.0 Fundamentals	Available on Request (5 days)	\$1800-\$2300	14609
Prerequisites: Familiarity with the Windows interface; basic knowledge of word processing and spreadsheet applications; and knowledge of COBOL, Basic, or another language including experience using variable, control structures, and looping structures. Topics Include: Introduction to Application Development with Visual Basic; Creating a Simple Visual Basic-Based Application; Working With Forms; Working With Controls; Using Variables and Procedures; Controlling Program Execution; Debugging and Handling Errors; Validating Input and Manipulating Data; Implementing Menus, Status Bars, and Toolbars; Accessing Data With the Data Control; Introduction to ActiveX; and Adding the Finishing Touches.			
Windows NT Security	Available on Request (5 days)	\$1800-\$2300*	14611
Prerequisite(s): Windows NT 4.0 Workstation and Server class (EDS # 12729) or equivalent knowledge and experience. Topics Include: An Overview of Security Objectives; Developing a Windows NT Security Policy; Trusted Computing Base (TCB); Microsoft's Security Commitment; Practical Implications of C2 Security; The NT Security Subsystem; NT Security Components; Planning Domains; Managing Accounts and Groups; The Windows NT Server and its Registry; Setting Up Shared Resources; Basic ACLs for Files and Directories; Controlling Access; Mechanics of Auditing; Common Auditing Scenarios; Tracking Applications with Security Logs; Protecting Your Network from Hostile Intruders; Securing Microsoft IIS; Implementing Firewalls; Thwarting the Threat from Within; and The Evolution of Windows NT Security.			

INTEGRATED COMPUTING NETWORK (ICN) VALIDATION REQUEST

Instructions:

- (1) Complete all parts of this form that apply to you. Please take note of the "Special Requirements" section and complete any applicable parts.
- (2) Manager (Group Leader or above) authorization and signature are required for all validation requests.
- (3) Before submitting this request, ensure that your Employee Information System (EIS) information is current.
- (4) Once completed, either mail this request to the Password Office at MS-B251, fax it to (505) 667-9617, or, if you are cleared, handcarry it to TA-3, SM-200, Room 257.

If you have **questions** call (505) 665-1805 or send e-mail to validate@lanl.gov

Owner Information

Z-Number (if you have one)		Name (last, first, middle initial)	
LANL Group	Phone Number	LANL Mail Stop	Citizenship (Foreign National see "Special Requirements-Foreign National")

Check LANL affiliation:

☐ LANL employee

☐ Contractor _____
(specify contract company)

☐ External user _____
(specify employer)

☐ Other (specify) _____

Send password / smartcard to:

☐ Mail Stop or ☐ Mail to address indicated below

Name / Organization

Address

City, State, Zip Code

Access Check access method and needed partitions:

Access method: <input type="checkbox"/> ICN Password <input type="checkbox"/> Smartcard <input type="checkbox"/> Both	
<input type="checkbox"/> Open partition (e.g., open machines, or for dial up access)	
<input type="checkbox"/> Administrative partition (e.g., Travel, Data Warehouse, IA [BUCS, Stores], IB [EIS, FMIS, PAIRS]) If you are not a cleared LANL employee, see required steps in section "Special Requirements-Administrative Partition".	
<input type="checkbox"/> Secure partition (i.e., secure machines) A Q-clearance is required for secure access. After obtaining Manager signature for Secure access, handcarry this form to the Password Office to obtain your Secure account.	<div style="border: 1px solid black; padding: 5px;"> <p>I certify this person does require secure access:</p> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> _____ Manager Signature (Group Leader or above) _____ Date </div> </div>

Password Office Use Only

New <input type="checkbox"/>	Change <input type="checkbox"/>	Clearance Status	Processed	Lv	Smartcard Serial #
Comments:					

Special Requirements

Administrative Partition

Lab-Wide Systems (e.g., Travel, Data Warehouse, IA [BUCS, Stores], IB [EIS, FMIS, PAIRS])

☐ Under 18 years of age If you need to access Administrative systems, your Group Leader must provide a memo accepting responsibility for your actions and justifying your need for access. This memo is to accompany all forms taken to the security briefing (see "Contractor or Non-Cleared") section below. You may not access the Secure Partition.

☐ Contractor or Non-Cleared Phone (505) 665-4444 (option #2) to obtain Access Authorization packet.
Phone (505) 667-9153 to schedule a security briefing.
Bring all forms including this ICN Validation Request to the security briefing for approval.

CIC-6 Security Briefing Approval Signature

Date

☐ Foreign National

Attach a copy of Form 982 (REQUEST FOR UNCLASSIFIED VISIT OR ASSIGNMENT BY A FOREIGN NATIONAL) with all approval signatures. Be sure Box #11 of Form 982 is completed. If you are not a visitor/assignee under a LANL/DOE approved Visit / Assignment Request, attach written justification from your host Group Leader or Division Director describing your need to access the ICN.

Authorization (required)

Print Manager Name (Group Leader or above)	Manager Z-Number	Group
Manager Signature (Group Leader or above)	Mail Stop	Date

If you are NOT a LANL employee you must have a LANL contact and obtain the contact's signature in addition to the contact's manager's signature.

LANL contact: Read the following and sign below.

By signing this form I affirm that I understand and accept the following:

- I am a regular Laboratory employee.
- I am responsible for forwarding password reauthorizations and verifying annual account reauthorizations for this user.
- I am responsible for notifying the Password Office within 10 days of changes in my status.
- I am responsible for notifying the Password Office immediately of changes in this user's status (termination, end of contract, etc.).

Print LANL Contact Name	Contact Z-Number	Phone Number	Group
LANL Contact Signature	Mail Stop	Date	

NOTE: All Laboratory computers, computing systems, and their associated communication systems are for official business only. By completing this validation request and signing for a password and/or smartcard, you agree not to misuse the ICN. The Laboratory has the responsibility and authority to periodically audit user files.

Reader Feedback

Feedback helps us to provide a document that responds to the changing needs of its readership. If you have comments or questions about this publication, please let us hear from you. We have reserved the back of this form for that purpose. We also accept articles for publication that are of interest to our readers. Contact the managing editor for more information. This form is also used for new subscriptions, deletions, or changes. Instructions are on the back. If you prefer to contact us by E-mail, send your comments and/or subscription request to finney@lanl.gov.

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NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 88 LOS ALAMOS NM

POSTAGE WILL BE PAID BY THE ADDRESSEE

MAIL STOP B251
ATTN: MIKE FINNEY, MANAGING EDITOR
CUSTOMER SERVICE GROUP (CIC-6)
LOS ALAMOS NATIONAL LABORATORY
PO BOX 1663
LOS ALAMOS NM 87544-9916



Do Not Staple, Seal with Tape
Fold Here

cut along dashed line

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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_____ Delete my name from the BITS mailing list.

_____ Change my name/address as indicated below.

Date

Mail Stop

Organization

Zip

Employee Z#

INDEX

Keywords	Title of BITS Article	Date	Page
<i>Automatic Script Identification</i>	<i>Automatic Script Identification from Document Images</i>	Dec. '97	4
<i>BITS Interviews</i>	<i>BITS Interviews Don Willerton</i>	Dec. '97	1
<i>BIOSIS at LANL</i>	<i>BIOSIS at LANL Database Available from the Research Library</i>	Feb. '98	13
<i>Business Systems</i>	<i>The Next Step for LANL Business Systems</i>	Feb. '98	6
<i>CCVAX</i>	<i>CCVAX Machine to be Decommissioned</i>	Aug. '97	1
<i>CFT77 Compiler</i>	<i>New Version of CFT77 Compiler Temporarily Available</i>	Sept. '97	11
<i>CIC (Computing, Information, & Communications)</i>	<i>CIC Division Strategies and Tactical Goals</i>	May '97	6
	<i>CIC Division Annual Report Available On Line</i>	Oct. '97	7
	<i>New CIC Recharge System Available on the Web</i>	Nov. '97	3
	<i>Holiday Schedule for CIC Production Computing</i>	Dec. '97	7
	<i>[CIC] Division Leader Gives "30,000-Foot View" for the Next Five Years</i>	Feb. '98	1
<i>CIC-6</i>	<i>CIC-6 Provides Desktop Consulting</i>	Mar. '97	1
	<i>The CIC-6 Training, Development, and Coordination Team</i>	May '97	1
	<i>CIC-6 Desktop Consulting Statistics</i>	Nov. '97	11
<i>Database</i>	<i>DOE Energy Database Now Available in a WWW Version</i>	Apr. '97	3
<i>Electronic Journals</i>	<i>Improved Access to Electronic Journals from Your Desktop</i>	Apr. '97	2
	<i>Accessing Electronic Journals for Research in Computer Science</i>	Feb. '98	12
<i>E-mail</i>	<i>MacTips: Dealing with [E-mail] Attachments in Eudora Pro</i>	Aug. '97	16
	<i>E-Mail Server Now Available in the Secure Network</i>	Feb. '98	8
<i>Employee Information System</i>	<i>Keeping the Employee Information System Current</i>	Sept. '97	2
<i>Environmental Management</i>	<i>Workshop on the Role of Modeling and Simulation in Environmental Management</i>	Aug. '97	2
<i>ESD</i>	<i>ESD Provides Unexpected Software Savings</i>	Feb. '98	8
<i>Fortran 90</i>	<i>Fortran 90, Programming Environments, and Policy</i>	Sept. '97	12
	<i>The Removal of Fortran 90 1.0 Version</i>	Sept. '97	16
<i>Gartner</i>	<i>Gartner Group Services Available on the Web</i>	June '97	4
	<i>GartnerWeb Update</i>	Aug. '97	5
<i>GeoRef</i>	<i>GeoRef Now Available at Your Desktop</i>	Feb. '98	13
<i>GNU Utilities</i>	<i>More GNU Utilities Available in /usr/lanl</i>	Sept. '97	6
<i>High-Performance Storage System</i>	<i>High-Performance Storage System</i>	Nov. '97	4
<i>HTML (HyperText Markup Language)</i>	<i>The Coming of Age of HTML Frames</i>	Sept. '97	7
<i>ICN (Integrated Computing Network)</i>	<i>The ICN Password Office</i>	June '97	1
<i>ICNN (Integrated Computing Network News)</i>	<i>The Integrated Computing Network News (ICNN) Web Site</i>	May '97	3
<i>JavaScript</i>	<i>JavaScript Observations and Tips: Part I</i>	Mar. '97	10
	<i>JavaScript Observations and Tips: Part II</i>	May '97	11
<i>Knowledge Management</i>	<i>What's this Knowledge Management Stuff?</i>	Dec. '97	7
<i>Lab-Wide Systems</i>	<i>Accessing GUI Lab-Wide Systems on the Macintosh</i>	Mar. '97	9
	<i>Customer Feedback Guides Improvements to Labwide Systems</i>	Aug. '97	4
	<i>Avoiding Print Problems on Labwide Systems</i>	Feb. '98	10
<i>LDSWG</i>	<i>Locally Developed Software Working Group (LDSWG) Reconvenes</i>	Dec. '97	6
<i>Macintosh</i>	<i>MacTips: Mac OS 8.0</i>	Sept. '97	10
<i>Micoms</i>	<i>The End of an Era: No More Micoms</i>	May '97	2

Keywords	Title of BITS Article	Date	Page
<i>Microsoft</i>	<i>New Microsoft SELECT Program Lowers Software Costs</i>	<i>Mar. '97</i>	<i>2</i>
	<i>New Software-Purchasing Feature Brings Savings on Microsoft Upgrades</i>	<i>June '97</i>	<i>9</i>
	<i>Laboratory Stretches Software Dollars [Microsoft SELECT]</i>	<i>Aug. '97</i>	<i>15</i>
<i>Modem</i>	<i>New Dial-Up Modem Number for Accessing E-mail from Home or Travel</i>	<i>Aug. '97</i>	<i>5</i>
	<i>Dial-Up Modem Upgrade</i>	<i>Nov. '97</i>	<i>2</i>
<i>Oil Reservoir Simulation Project</i>	<i>Amoco/LANL/CRI High-Performance Oil Reservoir Simulation Project</i>	<i>Sept. '97</i>	<i>1</i>
<i>Pagemart</i>	<i>Pagemart Offers Expanded Paging Capabilities</i>	<i>Sept. '97</i>	<i>5</i>
<i>Password</i>	<i>Hackers Sniff LANL Passwords</i>	<i>Oct. '97</i>	<i>6</i>
<i>POOMA</i>	<i>Parallel Object-Oriented Methods and Applications (POOMA)</i>	<i>Nov. '97</i>	<i>1</i>
<i>Programming Environment Modules</i>	<i>Using Programming Environment Modules</i>	<i>Sept. '97</i>	<i>14</i>
<i>REDI</i>	<i>The REDI Project</i>	<i>Apr. '97</i>	<i>4</i>
<i>Research Library</i>	<i>Research Library's WWW Online Catalog</i>	<i>Mar. '97</i>	<i>4</i>
	<i>Accessing On-line Computing Literature via the Research Library</i>	<i>Aug. '97</i>	<i>6</i>
<i>RHO</i>	<i>Machine RHO Soon to Retire</i>	<i>Aug. '97</i>	<i>1</i>
	<i>Retirement of Machine RHO Postponed</i>	<i>Oct. '97</i>	<i>7</i>
<i>Screen Shots</i>	<i>Capture that Image: Screen Shots on Multiple Platforms</i>	<i>Aug. '97</i>	<i>11</i>
<i>SciSearch at LANL</i>	<i>SciSearch at LANL Version 3.0 Released</i>	<i>Dec. '97</i>	<i>8</i>
<i>TeleFlex and GWIS</i>	<i>TeleFlex and GWIS</i>	<i>Feb. '98</i>	<i>4</i>
<i>Telnet</i>	<i>Configuring Telnet as a Supporting Application under Netscape 3.X</i>	<i>Mar. '97</i>	<i>7</i>
<i>TIG (Terminal Internet Gateway)</i>	<i>Dial-Up TIG for the Administrative Network Now Available</i>	<i>May '97</i>	<i>9</i>
<i>Universal Serial Bus (USB)</i>	<i>The Universal Serial Bus Has Arrived</i>	<i>Apr. '97</i>	<i>6</i>
<i>VersaTerm-PRO</i>	<i>Configuring Your Macintosh Keyboard for VersaTerm-PRO</i>	<i>May '97</i>	<i>10</i>
<i>Video Teleconference Center</i>	<i>Video Teleconference Center Offers New Capabilities</i>	<i>Apr. '97</i>	<i>1</i>
	<i>Video Teleconference Center Offers New Capabilities [Update to previous article]</i>	<i>Oct. '97</i>	<i>2</i>
<i>Visualization Team</i>	<i>CIC-8 Visualization Team</i>	<i>Oct. '97</i>	<i>1</i>
<i>World Wide Web (WWW or Web)</i>	<i>Web Security in the Open Network Security Model</i>	<i>Apr. '97</i>	<i>7</i>
	<i>Using the Web to Track Funding Opportunities</i>	<i>June '97</i>	<i>3</i>
	<i>Web Cookies: Their Reason, Nature, and Security</i>	<i>June '97</i>	<i>6</i>
	<i>Active Content and Web Browser Security</i>	<i>Aug. '97</i>	<i>8</i>
	<i>Maintaining Effective Web Pages: More Tips and Tricks</i>	<i>Oct. '97</i>	<i>8</i>
	<i>Making the Web Accessible Part 1: Overview and Graphics</i>	<i>Nov. '97</i>	<i>6</i>
	<i>Research Library's WWW Online Catalog Improved</i>	<i>Nov. '97</i>	<i>10</i>
	<i>Web Sites on Datamining</i>	<i>Nov. '97</i>	<i>10</i>
<i>Year 2000 (Y2K)</i>	<i>Making the Web Accessible Part 2: Text Issues and Conclusion</i>	<i>Dec. '97</i>	<i>9</i>
	<i>Is Your Computer Ready for the Year 2000</i>	<i>Dec. '97</i>	<i>3</i>

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